

PUBLICATION NUMBER : 2002308420  
 PUBLICATION DATE : 23-10-02

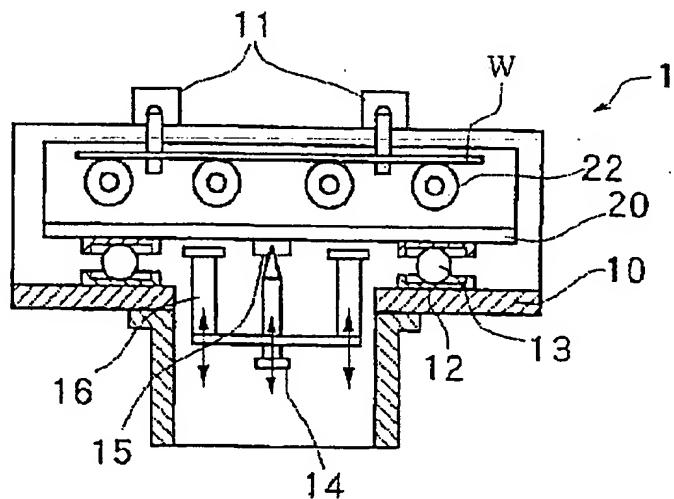
APPLICATION DATE : 10-04-01  
 APPLICATION NUMBER : 2001111796

APPLICANT : CANON INC;

INVENTOR : KUBOTA TOMOYUKI;

INT.CL. : B65G 49/06 C03B 33/037 G02F 1/13  
 H01L 21/68

TITLE : POSITIONING DEVICE OF GLASS  
 SUBSTRATE



ABSTRACT : PROBLEM TO BE SOLVED: To provide a positioning device of a glass substrate capable of highly precisely positioning the glass substrate without producing dust, etc.

SOLUTION: This positioning device of the glass substrate to position the glass substrate at a specified position is furnished with a supporting means to support the glass substrate, a base member to support the supporting means, a slide mechanism to support the supporting means free to slide in the surface inside direction of the glass substrate against the base member and a positioning mechanism provided on the base member and to position the glass substrate in the surface inside direction by hitting a side surface of the glass substrate.

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CLAIMS

## [Claim(s)]

[Claim 1] The support means for being the pointing device of the glass substrate for positioning a glass substrate to a position, and supporting said glass substrate, The base member for supporting this support means, and the sliding mechanism for supporting said support means possible [ a slide ] to the field inboard of said glass substrate to said base member, The pointing device of the glass substrate characterized by providing the positioning device for positioning this glass substrate to the field inboard by being prepared in said base member and running against the side face of said glass substrate.

[Claim 2] Said support means is the pointing device of the glass substrate according to claim 1 characterized by including the roller of the conveyance conveyor which consists of the rubber-like quality of the material.

[Claim 3] Said support means is the pointing device of the glass substrate according to claim 1 characterized by including the adsorption plate for adsorbing said glass substrate.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the pointing device of the glass substrate for positioning a glass substrate to a position.

[0002]

[Description of the Prior Art] The approach of dashing against a holddown member was common by putting a glass substrate on supporter material, such as a stage, and pushing a substrate edge as an approach of performing positioning of a glass substrate, conventionally.

[0003] However, there is a possibility of supporter material and a glass substrate being worn, generating particle, and making Rhine polluting with this approach. If the particle rides on a glass substrate, a product will turn into a defective and will be a big problem.

[0004] Then, the method of positioning a substrate without generating of particle is also proposed, for example, the glass substrate on a robot hand is brought over an X-Y stage, the location of a glass substrate is adjusted by detecting a substrate edge by the sensor formed in the X-Y stage, and the method (JP,07-306391,A) of putting a substrate on an X-Y stage is learned.

[0005]

[Problem(s) to be Solved by the Invention] However, utilization is difficult, when highly-minute-izing and big screenization progresses and highly precise positioning is required, in order that the positioning accuracy of a substrate may depend for the positioning approach using the above-mentioned X-Y stage on the detection precision of the sensor which detects a substrate edge, and a robot's location precision. Moreover, since it becomes justification while looking at the output from a sensor, the time amount which is dashed and positioning takes as compared with positioning by the method is also prolonged.

[0006] Therefore, this invention is made in view of the technical problem mentioned above, and the purpose is offering the pointing device of the glass substrate which can position a glass substrate with high precision, without generating dust etc.

[0007]

[Means for Solving the Problem] In order to solve the technical problem mentioned above and to attain the purpose, the pointing device of the glass substrate concerning this invention The support means for being the pointing device of the glass substrate for positioning a glass substrate to a position, and supporting said glass substrate, The base member for supporting this support means, and the sliding mechanism for supporting said support means possible [ a slide ] to the field inboard of said glass substrate to said base member, It is characterized by providing the positioning device for positioning this glass substrate to the field inboard by being prepared in said base member and running against the side face of said glass substrate.

[0008] Moreover, in the positioning device of the glass substrate concerning this invention, said support means is characterized by including the roller of the conveyance conveyor which consists of the rubber-like quality of the material.

[0009] Moreover, in the pointing device of the glass substrate concerning this invention, said support means is characterized by including the adsorption plate for adsorbing said glass substrate.

[0010]

[Embodiment of the Invention] One operation gestalt which applied this invention with reference to the accompanying drawing below when glass substrates, such as a liquid crystal panel, were positioned on a conveyance conveyor is explained. The supporter material in this example serves as a conveyance conveyor.

[0011] An example of a system configuration which conveys a glass substrate is shown in drawing 7. Glass substrate W is conveyed by carrying out the rotation drive of the conveyance roller 6 in the substrate conveyance conveyor 2 top. Glass substrate W is sequentially processed at the washing process of a substrate, a desiccation process; a spreading process, a patterning process, a phenomenon process, etc. Then, from the delivery location B on the conveyance conveyor 2, glass substrate W is taken out with the substrate reserve robot 3, and is set on the substrate stage C of the process unit 4 of each process. Again, from on a stage 3, processed glass substrate W is discharged by the discharge location D of the conveyance conveyor 2, and is conveyed by the substrate reserve robot 3 to degree process.

[0012] In the flow which processes glass substrates, such as the above liquid crystal panels, it is necessary to position a glass substrate in a predetermined precision on the delivery location B of a glass substrate, and the substrate stage C of a process unit 4. in the positioning, if \*\*\*\* arises between the conveyance roller of glass substrate W and the conveyance conveyor 2, or the substrate stage C of a process unit 4, grind against it -- the raising dust boiled and depended -- and grind -- electrification of the substrate boiled and twisted takes place and there is a possibility of making foreign matters, such as dust, adhering on a substrate.

[0013] The device which there is no \*\*\*\* in drawing 1 thru/or drawing 3, and can be positioned to it in the case of positioning of a glass substrate is shown. Drawing 1 is [ the A-A sectional view of drawing 1 and drawing 3 of the plan of the positioning unit 1 and drawing 2 ] the B-B sectional views of drawing 1.

[0014] With reference to drawing 1 thru/or drawing 3, and drawing 7, it explains below.

[0015] Glass substrate W conveyed by conveyance conveyor 2 is stopped by the position by detecting an edge by the existence sensor 17 of a glass substrate. Although glass substrate W is positioned in a predetermined precision to the feed direction of a glass substrate by this halt approach, to the direction of a right angle (cross direction), any regulation cannot be found to delivery, and a location will vary greatly.

[0016] As mentioned above, in order to vary crosswise and to grasp a stopped substrate with the reserve robot 3, it is necessary to position the cross direction of a substrate. Below, the positioning approach of the cross direction of the glass substrate W is explained.

[0017] The conveyance roller 22 which puts a substrate and is conveyed in the predetermined direction by rotating is supported with the roller shaft 21 fixed to the body 20 of a conveyor, two or more rollers synchronize and the rotation drive of it is carried out by a non-illustrated motor and the non-illustrated timing belt. Moreover, the quality of the material with high coefficient of friction like rubber, such as an elastomer, is being used for the quality of the material of the conveyance roller 22.

[0018] The floating device which wins popularity so that the body 20 of a conveyor may run by few force freely to the base member 10 between the body 20 of a conveyor and the base member 10, as shown in drawing 6, and consists of a member 12 and a fastball 13 is arranged. Moreover, between the body 20 of a conveyor, and the base member 10, as shown in drawing 4  $R > 4$ , the positioning devices 14 and 15 of the body 20 of a conveyor by which a vertical drive is carried out are also arranged by the non-illustrated air cylinder, and the maintenance device 16 of the base member 20 in which a vertical drive is further carried out by the non-illustrated air cylinder as shown in drawing 3 and drawing 5 is also arranged.

[0019] moreover, at least three things which is driven by the air cylinder for positioning the cross direction of glass substrate W to the base member 10 and for which it dashes, and has a pin 11 (11a, 11B, 11C), and this air cylinder strengthens one air \*\* compared with another side -- always -- on the other hand, it considers as criteria, and it is constituted so that a position can be made to position.

[0020] The tooth space in which the air cylinder of the positioning devices 14 and 15 and the maintenance device 16 can be installed is provided in the center of the base member 10. And the exhauster style 18 which can exhaust the ambient atmosphere of the tooth space is formed, and removal of the particle generated at the time of the drive by the air cylinder and the positioning drive of a glass substrate is enabled.

[0021] Next, a motion of the positioning device of a glass substrate is explained.

[0022] Drawing 8 is a flow chart explaining a motion.

[0023] In the <STEP1> positioning unit 1, the body 20 of a conveyor is made free by dropping the maintenance device 16, and by raising the positioning device 14, the member 15 of a taper configuration is thrust up and it positions to a position. This location is an initial valve position of the body 20 of a conveyor, and turns into a location in which glass substrate W is accepted.

[0024] <STEP2>, next the maintenance device 16 are raised, and the body 20 of a conveyor is fixed to a base member by dropping the positioning device 14.

[0025] <STEP3> In this condition, it waits to convey glass substrate W from a last process.

[0026] If a sensor 17 detects the glass substrate conveyed by the <STEP4> positioning unit 1, glass substrate W will be

stopped by stopping the motor which is carrying out the rotation drive of the conveyance roller 22.

[0027] After canceling <STEP5>, next the maintenance device 16 and changing the body 20 of a conveyor into a free condition, it positions by making the positioning device 11 of glass substrate W drive, and moving the body 20 of a conveyor to a position.

[0028] At this time, to the frictional force of the conveyance roller 22 and glass substrate W, since the migration drag force of the body 20 of a conveyor is weaker, there is no gap between glass substrate W and the conveyance roller 22, that is, they will move [ glass substrate W and the body 20 of a conveyor are united, and ].

[0029] If <STEP6> positioning is completed, the maintenance device 16 will go up and glass substrate W will also be held with the body 20 of a conveyor in the positioned location.

[0030] <STEP7> After being held, the positioning device 11 of a glass substrate is canceled, and it holds according to the maintenance device 16 until glass substrate W positioned by the substrate reserve robot 3 is taken out.

[0031] <STEP8> After glass substrate W currently held is carried out, it returns to STEP1.

[0032] It becomes possible to be positioned to the member to which glass substrate W contacts a glass substrate as mentioned above, without rubbing.

[0033] although the positioning device on the conveyance roller whose support means of glass substrate W is a conveyance roller has so far been explained, if the above-mentioned body 20 of a conveyor is transposed to plates in a process unit 4, such as a chuck and a hot plate, a plate and a glass substrate should grind it similarly -- it becomes possible to position that there is nothing. Although the glass substrate was adsorbed at the plate side after positioning a glass substrate conventionally at this time, glass substrate W and a plate can be made to fix by adsorbing a glass substrate before positioning actuation, so that it may not shift by adsorption power.

[0034] moreover, to be shown in drawing 9, there is no body 20 of a conveyor, and the roller shaft 21 should be supported by the base member 10, and grind between the conveyance roller 22 and glass substrate W similarly in the configuration which conveys a substrate by carrying out a rotation drive by the non-illustrated motor -- it can position that there is nothing.

[0035] In this case, what is necessary is for there to be no slipping to hands of cut, such as a ball bearing, in the roller shaft 21, and just to attach the conveyance roller 22 through the sliding mechanism 23 in which a horizontal slide is possible, as shown in drawing 10. Furthermore, the conveyance roller 22 has taken the structure sandwiched by the spring 24 grade so that it may be brought near by the center position of the movable range of a roller shaft at the time of no-load, and in case a substrate is conveyed, it is located in the center of the movable range.

[0036] If the positioning device 11 of glass substrate W \*\*\*\*\* after conveying a substrate and stopping in a position, the conveyance roller 22 will slide with a sliding mechanism 23. The maintenance device 16 goes up at the time of in position, and while holding a conveyance roller in the positioned location, glass substrate W is held.

[0037] In the condition of having been held, the positioning device 11 of a glass substrate is canceled and the substrate reserve robot 3 becomes possible [ grasping a glass substrate ].

[0038] According to this operation gestalt, as stated above, since the supporter material which supports a glass substrate can move freely according to a floating device, it completely rubs between a glass substrate and supporter material at the time of positioning of a glass substrate, and there is no \*\* in it. Moreover, the former and this appearance dash positioning and it is a method.

[0039] Therefore, highly precise positioning is attained, without it seeming that generating of particle and a glass substrate are charged.

[0040] Moreover, it is possible to include also in the substrate transport device of a conveyor method, and after utilizing the conventional facility as it was, positioning without raising dust is attained.

[0041] Furthermore, on the processing stage of various purposes which hold a glass substrate by adsorption, generating of the particle in positioning of the glass substrate on a stage can be prevented similarly.

[0042]

[Effect of the Invention] According to this invention, the thing which were explained above and for which a glass substrate is positioned with high precision becomes possible like, without generating dust etc.

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TECHNICAL FIELD

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[Field of the Invention] This invention relates to the pointing device of the glass substrate for positioning a glass substrate to a position.

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## PRIOR ART

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[Description of the Prior Art] The approach of dashing against a holddown member was common by putting a glass substrate on supporter material, such as a stage, and pushing a substrate edge as an approach of performing positioning of a glass substrate, conventionally.

[0003] However, there is a possibility of supporter material and a glass substrate being worn, generating particle, and making Rhine polluting with this approach. If the particle rides on a glass substrate, a product will turn into a defective and will be a big problem.

[0004] Then, the method of positioning a substrate without generating of particle is also proposed, for example, the glass substrate on a robot hand is brought over an X-Y stage, the location of a glass substrate is adjusted by detecting a substrate edge by the sensor formed in the X-Y stage, and the method (JP,07-306391,A) of putting a substrate on an X-Y stage is learned.

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## EFFECT OF THE INVENTION

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## TECHNICAL PROBLEM

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[0006] Therefore, this invention is made in view of the technical problem mentioned above, and the purpose is offering the pointing device of the glass substrate which can position a glass substrate with high precision, without generating dust etc.

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MEANS

[Means for Solving the Problem] In order to solve the technical problem mentioned above and to attain the purpose, the pointing device of the glass substrate concerning this invention The support means for being the pointing device of the glass substrate for positioning a glass substrate to a position, and supporting said glass substrate, The base member for supporting this support means, and the sliding mechanism for supporting said support means possible [ a slide ] to the field inboard of said glass substrate to said base member, It is characterized by providing the positioning device for positioning this glass substrate to the field inboard by being prepared in said base member and running against the side face of said glass substrate.

[0008] Moreover, in the positioning device of the glass substrate concerning this invention, said support means is characterized by including the roller of the conveyance conveyor which consists of the rubber-like quality of the material.

[0009] Moreover, in the pointing device of the glass substrate concerning this invention, said support means is characterized by including the adsorption plate for adsorbing said glass substrate.

[0010]

[Embodiment of the Invention] One operation gestalt which applied this invention with reference to the accompanying drawing below when glass substrates, such as a liquid crystal panel, were positioned on a conveyance conveyor is explained. The supporter material in this example serves as a conveyance conveyor.

[0011] An example of a system configuration which conveys a glass substrate is shown in drawing 7 . Glass substrate W is conveyed by carrying out the rotation drive of the conveyance roller 6 in the substrate conveyance conveyor 2 top. Glass substrate W is sequentially processed at the washing process of a substrate, a desiccation process, a spreading process, a patterning process, a phenomenon process, etc. Then, from the delivery location B on the conveyance conveyor 2, glass substrate W is taken out with the substrate reserve robot 3, and is set on the substrate stage C of the process unit 4 of each process. Again, from on a stage 3, processed glass substrate W is discharged by the discharge location D of the conveyance conveyor 2, and is conveyed by the substrate reserve robot 3 to degree process.

[0012] In the flow which processes glass substrates, such as the above liquid crystal panels, it is necessary to position a glass substrate in a predetermined precision on the delivery location B of a glass substrate, and the substrate stage C of a process unit 4. in the positioning, if \*\*\*\* arises between the conveyance roller of glass substrate W and the conveyance conveyor 2, or the substrate stage C of a process unit 4, grind against it -- the raising dust boiled and depended -- and grind -- electrification of the substrate boiled and twisted takes place and there is a possibility of making foreign matters, such as dust, adhering on a substrate.

[0013] The device which there is no \*\*\*\* in drawing 1 thru/or drawing 3 , and can be positioned to it in the case of positioning of a glass substrate is shown. Drawing 1 is [ the A-A sectional view of drawing 1 and drawing 3 of the plan of the positioning unit 1 and drawing 2 ] the B-B sectional views of drawing 1 .

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[0016] As mentioned above, in order to vary crosswise and to grasp a stopped substrate with the reserve robot 3, it is necessary to position the cross direction of a substrate. Below, the positioning approach of the cross direction of the glass substrate W is explained.

[0017] The conveyance roller 22 which puts a substrate and is conveyed in the predetermined direction by rotating is supported with the roller shaft 21 fixed to the body 20 of a conveyor, two or more rollers synchronize and the rotation

drive of it is carried out by a non-illustrated motor and the non-illustrated timing belt. Moreover, the quality of the material with high coefficient of friction like rubber, such as an elastomer, is being used for the quality of the material of the conveyance roller 22. [0018] The floating device which wins popularity so that the body 20 of a conveyor may run by few force freely to the base member 10 between the body 20 of a conveyor and the base member 10, as shown in drawing 6, and consists of a member 12 and a fastball 13 is arranged. Moreover, between the body 20 of a conveyor, and the base member 10, as shown in drawing 4 R> 4, the positioning devices 14 and 15 of the body 20 of a conveyor by which a vertical drive is carried out are also arranged by the non-illustrated air cylinder, and the maintenance device 16 of the base member 20 in which a vertical drive is further carried out by the non-illustrated air cylinder as shown in drawing 3 and drawing 5 is also arranged.

[0019] moreover, at least three things which is driven by the air cylinder for positioning the cross direction of glass substrate W to the base member 10 and for which it dashes, and has a pin 11 (11a, 11B, 11C), and this air cylinder strengthens one air \*\* compared with another side -- always -- on the other hand, it considers as criteria, and it is constituted so that a position can be made to position.

[0020] The tooth space in which the air cylinder of the positioning devices 14 and 15 and the maintenance device 16 can be installed is provided in the center of the base member 10. And the exhauster style 18 which can exhaust the ambient atmosphere of the tooth space is formed, and removal of the particle generated at the time of the drive by the air cylinder and the positioning drive of a glass substrate is enabled.

[0021] Next, a motion of the positioning device of a glass substrate is explained.

[0022] Drawing 8 is a flow chart explaining a motion.

[0023] In the <STEP1> positioning unit 1, the body 20 of a conveyor is made free by dropping the maintenance device 16, and by raising the positioning device 14, the member 15 of a taper configuration is thrust up and it positions to a position. This location is an initial valve position of the body 20 of a conveyor, and turns into a location in which glass substrate W is accepted.

[0024] <STEP2>, next the maintenance device 16 are raised, and the body 20 of a conveyor is fixed to a base member by dropping the positioning device 14.

[0025] <STEP3> In this condition, it waits to convey glass substrate W from a last process.

[0026] If a sensor 17 detects the glass substrate conveyed by the <STEP4> positioning unit 1, glass substrate W will be stopped by stopping the motor which is carrying out the rotation drive of the conveyance roller 22.

[0027] After canceling <STEP5>, next the maintenance device 16 and changing the body 20 of a conveyor into a free condition, it positions by making the positioning device 11 of glass substrate W drive, and moving the body 20 of a conveyor to a position.

[0028] At this time, to the frictional force of the conveyance roller 22 and glass substrate W, since the migration drag force of the body 20 of a conveyor is weaker, there is no gap between glass substrate W and the conveyance roller 22, that is, they will move [ glass substrate W and the body 20 of a conveyor are united, and ].

[0029] If <STEP6> positioning is completed, the maintenance device 16 will go up and glass substrate W will also be held with the body 20 of a conveyor in the positioned location.

[0030] <STEP7> After being held, the positioning device 11 of a glass substrate is canceled, and it holds according to the maintenance device 16 until glass substrate W positioned by the substrate reserve robot 3 is taken out.

[0031] <STEP8> After glass substrate W currently held is carried out, it returns to STEP1.

[0032] It becomes possible to be positioned to the member to which glass substrate W contacts a glass substrate as mentioned above, without rubbing.

[0033] although the positioning device on the conveyance roller whose support means of glass substrate W is a conveyance roller has so far been explained, if the above-mentioned body 20 of a conveyor is transposed to plates in a process unit 4, such as a chuck and a hot plate, a plate and a glass substrate should grind it similarly -- it becomes possible to position that there is nothing. Although the glass substrate was adsorbed at the plate side after positioning a glass substrate conventionally at this time, glass substrate W and a plate can be made to fix by adsorbing a glass substrate before positioning actuation, so that it may not shift by adsorption power.

[0034] moreover, to be shown in drawing 9, there is no body 20 of a conveyor, and the roller shaft 21 should be supported by the base member 10, and grind between the conveyance roller 22 and glass substrate W similarly in the configuration which conveys a substrate by carrying out a rotation drive by the non-illustrated motor -- it can position that there is nothing.

[0035] In this case, what is necessary is for there to be no slipping to hands of cut, such as a ball bearing, in the roller shaft 21, and just to attach the conveyance roller 22 through the sliding mechanism 23 in which a horizontal slide is possible, as shown in drawing 10. Furthermore, the conveyance roller 22 has taken the structure sandwiched by the

spring 24 grade so that it may be brought near by the center position of the movable range of a roller shaft at the time of no-load, and in case a substrate is conveyed, it is located in the center of the movable range.

[0036] If the positioning device 11 of glass substrate W \*\*\*\*\* after conveying a substrate and stopping in a position, the conveyance roller 22 will slide with a sliding mechanism 23. The maintenance device 16 goes up at the time of in position, and while holding a conveyance roller in the positioned location, glass substrate W is held.

[0037] In the condition of having been held, the positioning device 11 of a glass substrate is canceled and the substrate reserve robot 3 becomes possible [ grasping a glass substrate ].

[0038] According to this operation gestalt, as stated above, since the supporter material which supports a glass substrate can move freely according to a floating device, it completely rubs between a glass substrate and supporter material at the time of positioning of a glass substrate, and there is no \*\* in it. Moreover, the former and this appearance dash positioning and it is a method.

[0039] Therefore, highly precise positioning is attained, without it seeming that generating of particle and a glass substrate are charged.

[0040] Moreover, it is possible to include also in the substrate transport device of a conveyor method, and after utilizing the conventional facility as it was, positioning without raising dust is attained.

[0041] Furthermore, on the processing stage of various purposes which hold a glass substrate by adsorption, generating of the particle in positioning of the glass substrate on a stage can be prevented similarly.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the plan showing the configuration of 1 operation gestalt of a glass substrate positioning device.  
[Drawing 2] It is the A-A sectional view of drawing 1.  
[Drawing 3] It is the B-B sectional view of drawing 1.  
[Drawing 4] It is drawing which a positioning unit carries out initial-valve-position appearance, and explains a device.  
[Drawing 5] It is drawing explaining the maintenance device of a positioning unit.  
[Drawing 6] It is drawing explaining the floating device of a positioning unit.  
[Drawing 7] It is drawing explaining an example of the production process of a liquid crystal panel.  
[Drawing 8] It is a flow chart explaining the positioning approach of a glass substrate.  
[Drawing 9] It is drawing explaining other operation gestalten of the positioning device of a glass substrate.  
[Drawing 10] It is drawing explaining the floating device of other operation gestalten.

### [Description of Notations]

W Glass substrate  
1 Positioning Unit  
10 Base Member  
11 Positioning Device  
12 Receptacle Member  
13 Shot  
14-15 Positioning device  
16 Maintenance Device  
17 Sensor  
20 Body of Conveyor

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[Translation done.]

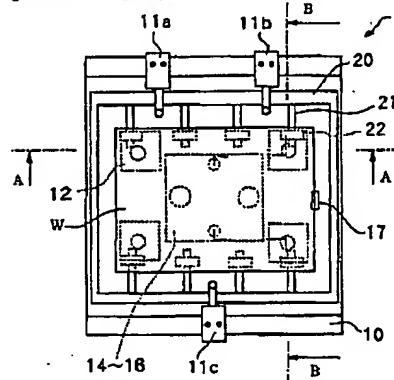
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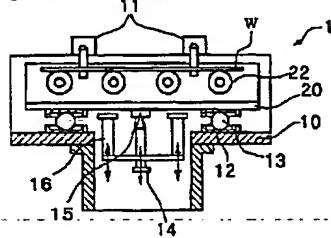
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## DRAWINGS

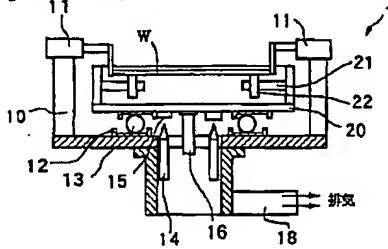
## [Drawing 1]



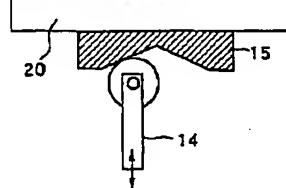
## [Drawing 2]



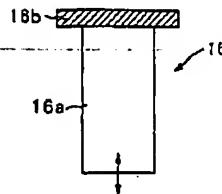
## [Drawing 3]



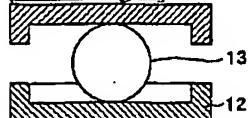
## [Drawing 4]



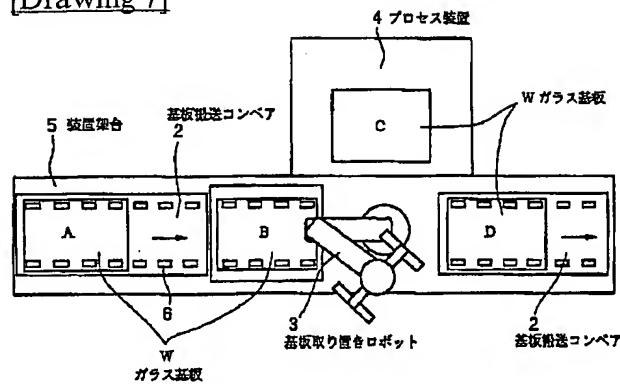
## [Drawing 5]



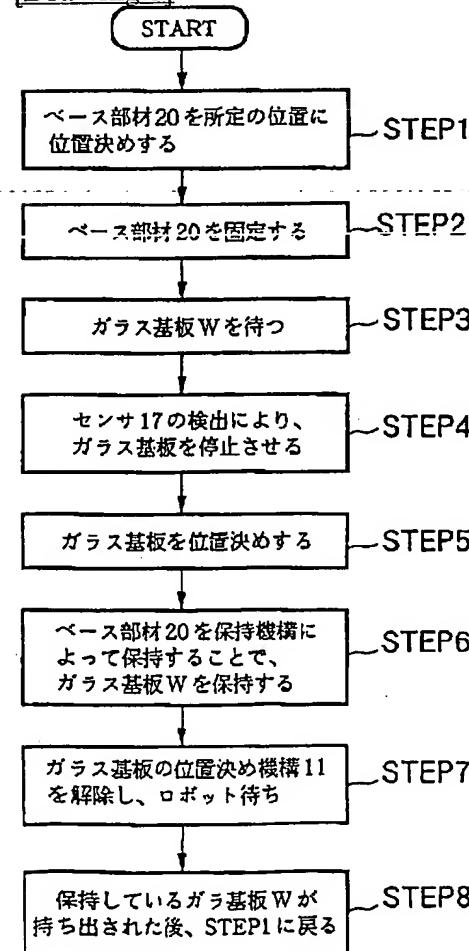
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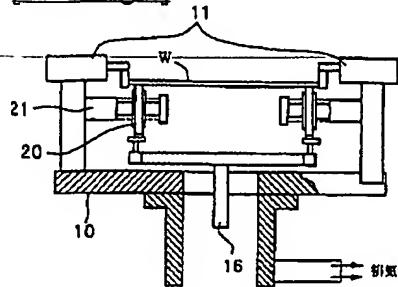
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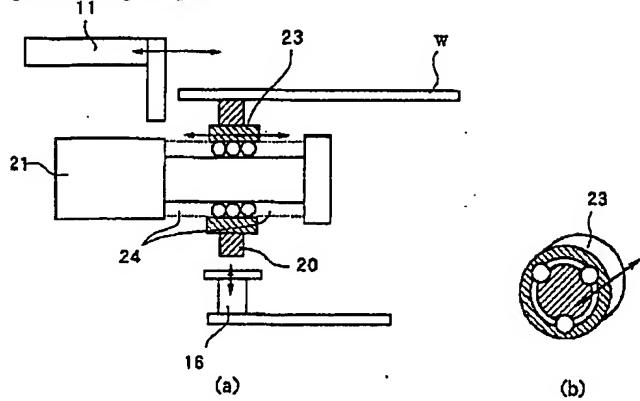
[Drawing 8]



[Drawing 9]



[Drawing 10]



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[Translation done.]

(19)日本国特許庁 (JP)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開2002-308420

(P2002-308420A)

(43)公開日 平成14年10月23日 (2002.10.23)

(51)Int.Cl.  
B 6 5 G 49/06  
C 0 3 B 33/037  
G 0 2 F 1/13  
H 0 1 L 21/68

識別記号  
101

F I  
B 6 5 G 49/06  
C 0 3 B 33/037  
G 0 2 F 1/13  
H 0 1 L 21/68

テ-マコ-ト(参考)  
Z 2 H 0 8 8  
4 G 0 1 5  
1 0 1 5 F 0 3 1  
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審査請求 未請求 請求項の数 3 O L (全 5 頁)

(21)出願番号 特願2001-111796(P2001-111796)

(22)出願日 平成13年4月10日 (2001.4.10)

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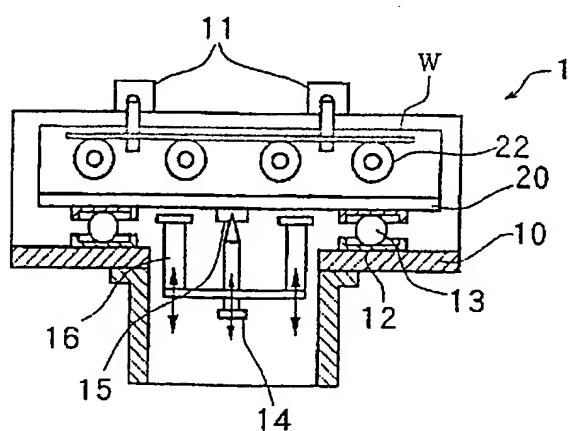
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(54)【発明の名称】ガラス基板の位置決め装置

(57)【要約】

【課題】ゴミ等を発生させることなくガラス基板を高精度に位置決めすることができるガラス基板の位置決め装置を提供する。

【解決手段】ガラス基板を所定の位置に位置決めするためのガラス基板の位置決め装置であって、前記ガラス基板を支持するための支持手段と、該支持手段を支持するためのベース部材と、前記支持手段を前記ベース部材に対して前記ガラス基板の面内方向にスライド可能に支持するためのスライド機構と、前記ベース部材に設けられ、前記ガラス基板の側面に突き当たることによって、該ガラス基板をその面内方向に位置決めするための位置決め機構とを具備する。



## 【特許請求の範囲】

【請求項1】 ガラス基板を所定の位置に位置決めするためのガラス基板の位置決め装置であって、前記ガラス基板を支持するための支持手段と、該支持手段を支持するためのベース部材と、前記支持手段を前記ベース部材に対して前記ガラス基板の面内方向にスライド可能に支持するためのスライド機構と、前記ベース部材に設けられ、前記ガラス基板の側面に突き当たることによって、該ガラス基板をその面内方向に位置決めするための位置決め機構とを具備することを特徴とするガラス基板の位置決め装置。

【請求項2】 前記支持手段は、ゴム状の材質から成る搬送コンベアのローラーを含むことを特徴とする請求項1に記載のガラス基板の位置決め装置。

【請求項3】 前記支持手段は、前記ガラス基板を吸着するための吸着プレートを含むことを特徴とする請求項1に記載のガラス基板の位置決め装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、ガラス基板を所定の位置に位置決めするためのガラス基板の位置決め装置に関するものである。

## 【0002】

【従来の技術】 従来、ガラス基板の位置決めを行う方法としては、ガラス基板をステージ等の支持部材に載せ、基板端部を押すことにより固定部材に突き当てる方法が一般的であった。

【0003】 しかし、この方法では、支持部材とガラス基板とが擦れ、パーティクルを発生させてしまいラインを汚染させてしまう恐れがある。そのパーティクルがガラス基板上に乗れば、製品が不良品となり大きな問題である。

【0004】 そこで、パーティクルの発生なく基板を位置決めする方法も提案されてきており、例えば、ロボットハンド上のガラス基板をXYステージ上空に持っていく、XYステージに設けられたセンサにより基板端部を検知することによってガラス基板の位置を調整し、XYステージに基板を載せる方法（特開平07-306391号公報）が知られている。

## 【0005】

【発明が解決しようとする課題】 しかしながら、上記のXYステージを用いた位置決め方法は、基板の位置決め精度が、基板端部を検出するセンサの検出精度、及び、ロボットの位置精度に依存するため、高精細化、大画面化が進み、より高精度な位置決めを要求される場合、実用化は困難である。また、センサからの出力を見ながらの位置調整となるため、突き当て方式による位置決めと比較して、位置決めに要する時間も延びる。

【0006】 従って、本発明は上述した課題に鑑みてな

されたものであり、その目的は、ゴミ等を発生させることなくガラス基板を高精度に位置決めすることができるガラス基板の位置決め装置を提供することである。

## 【0007】

【課題を解決するための手段】 上述した課題を解決し、目的を達成するために、本発明に係わるガラス基板の位置決め装置は、ガラス基板を所定の位置に位置決めするためのガラス基板の位置決め装置であって、前記ガラス基板を支持するための支持手段と、該支持手段を支持するためのベース部材と、前記支持手段を前記ベース部材に対して前記ガラス基板の面内方向にスライド可能に支持するためのスライド機構と、前記ベース部材に設けられ、前記ガラス基板の側面に突き当たることによって、該ガラス基板をその面内方向に位置決めするための位置決め機構とを具備することを特徴としている。

【0008】 また、この発明に係わるガラス基板の位置決め装置において、前記支持手段は、ゴム状の材質から成る搬送コンベアのローラーを含むことを特徴としている。

【0009】 また、この発明に係わるガラス基板の位置決め装置において、前記支持手段は、前記ガラス基板を吸着するための吸着プレートを含むことを特徴としている。

## 【0010】

【発明の実施の形態】 以下添付図面を参照して、本発明を液晶パネル等のガラス基板を搬送コンベア上に位置決めする場合に適用した一実施形態について説明する。この例での支持部材は搬送コンベアとなる。

【0011】 ガラス基板を搬送するシステム構成の一例を図7に示す。ガラス基板Wは、基板搬送コンベア2上を、搬送ローラー6を回転駆動させることによって搬送される。ガラス基板Wは、基板の洗浄工程、乾燥工程、塗布工程、パターニング工程、現象工程等で順次処理される。そこで、ガラス基板Wを搬送コンベア2上の受け渡し位置Bから、基板取り置きロボット3により取り出し、各工程のプロセス装置4の基板ステージC上にセットする。処理されたガラス基板Wは、再度、基板取り置きロボット3によって、ステージ3上から、搬送コンベア2の排出位置Dに排出され、次工程へと搬送される。

【0012】 上記のような、液晶パネル等のガラス基板を処理していく流れにおいて、ガラス基板の受け渡し位置B、および、プロセス装置4の基板ステージCでは、所定の精度でガラス基板を位置決めする必要がある。その位置決めにおいて、ガラス基板Wと搬送コンベア2の搬送ローラー、あるいは、プロセス装置4の基板ステージCとの間に、擦れが生じれば、擦れによる発塵、および、擦れによる基板の帯電が起こり、基板上にゴミ等の異物を付着させてしまう恐れがある。

【0013】 図1乃至図3に、ガラス基板の位置決めの際に、擦れが全くなく位置決めすることが可能な機構を

示す、図1は位置決めユニット1の上面図、図2は図1のA-A断面図、図3は図1のB-B断面図である。

【0014】図1乃至図3及び図7を参照して以下説明する。

【0015】搬送コンベア2によって、搬送されてきたガラス基板Wは、ガラス基板の有無センサ17により端部を検出することによって、所定の位置に停止される。この停止方法によって、ガラス基板Wは、ガラス基板の送り方向に対しては、所定の精度にて位置決めされるが、送りに対して直角方向（幅方向）に対しては、何の規制もなく、位置が大きくばらつくことになる。

【0016】上記のように、幅方向にばらついて停止している基板を、取り置きロボット3によって把持するためには、基板の幅方向の位置決めをする必要がある。以下に、そのガラス基板Wの幅方向の位置決め方法を説明する。

【0017】基板を乗せて、回転することによって所定の方向に搬送する搬送ローラー22は、コンベア本体20に固定されたローラー軸21によって支持されており、不図示のモータ及び不図示のタイミングベルトによって、複数のローラーが同期して回転駆動される。また、搬送ローラー22の材質は、エラストマーなどのゴムのような摩擦係数の高い材質を使用している。

【0018】コンベア本体20とベース部材10の間には、図6に示すようにコンベア本体20がベース部材10に対し僅かな力で自由に動くように受け部材12と剛球13から成るフローティング機構が配置されている。また、コンベア本体20とベース部材10の間には、図4に示すように、不図示のエアシリングによって上下駆動されるコンベア本体20の位置決め機構14、15も配置されており、更に、図3及び図5に示すように不図示のエアシリングによって上下駆動されるベース部材20の保持機構16も配置されている。

【0019】また、ベース部材10には、ガラス基板Wの幅方向の位置決めをするため、エアシリングによって駆動される少なくとも3つの突き当てピン11（11a、11B、11C）が備えられ、このエアシリングは、一方のエア圧を他方に比べて強くすることで、常に一方を基準として所定の位置に位置決めさせることができるよう構成されている。

【0020】ベース部材10の中央には、位置決め機構14、15および保持機構16のエアシリングが設置可能なスペースが設けられている。そして、そのスペースの雰囲気を排気することが可能な排気機構18が設けられており、エアシリングによる駆動、及び、ガラス基板の位置決め駆動時に発生するパーティクルの除去を可能としている。

【0021】次に、ガラス基板の位置決め機構の動きを説明する。

【0022】図8は、動きを説明するフローチャートで

ある。

【0023】<STEP 1>位置決めユニット1において、保持機構16を下降させることでコンベア本体20をフリーにし、位置決め機構14を上昇させることで、テーパー形状の部材15を突き上げ、所定の位置に位置決めする。この位置が、コンベア本体20の初期位置であり、ガラス基板Wを受け入れる位置となる。

【0024】<STEP 2>次に、保持機構16を上昇させ、位置決め機構14を下降させることで、コンベア本体20をベース部材に対し固定する。

【0025】<STEP 3>この状態で、ガラス基板Wが前工程より搬送されてくるのを待つ。

【0026】<STEP 4>位置決めユニット1に搬送されてきたガラス基板をセンサ17が検出すると、搬送ローラー22を回転駆動しているモータを停止させることにより、ガラス基板Wを停止させる。

【0027】<STEP 5>次に、保持機構16を解除してコンベア本体20をフリーな状態にしてから、ガラス基板Wの位置決め機構11を駆動させ、所定の位置にコンベア本体20を動かすことによって、位置決めする。

【0028】この時、搬送ローラー22とガラス基板Wとの摩擦力に対しコンベア本体20の移動抵抗力の方が弱いため、ガラス基板Wと搬送ローラー22との間にズレはなく、つまりガラス基板Wとコンベア本体20が一体となって動くことになる。

【0029】<STEP 6>位置決めが完了すると保持機構16が上昇し、位置決めした位置でコンベア本体20と共にガラス基板Wも保持される。

【0030】<STEP 7>保持された後、ガラス基板の位置決め機構11を解除し、基板取り置きロボット3により、位置決めされたガラス基板Wが取り出されるまで保持機構16によって保持する。

【0031】<STEP 8>保持しているガラス基板Wが持ち出された後、STEP 1に戻る。

【0032】以上の様にして、ガラス基板Wは、ガラス基板と接触する部材に対し、擦れることなく位置決めされることが可能となる。

【0033】これまで、ガラス基板Wの支持手段が搬送ローラーである搬送ローラー上での位置決め機構について説明してきたが、上記のコンベア本体20を、プロセス装置4における吸着ステージやホットプレート等のプレートに置き換えれば、同様にしてプレートとガラス基板の擦れなく位置決めすることが可能となる。このとき、従来はガラス基板の位置決めをした後に、ガラス基板をプレート側に吸着していたが、位置決め動作の前にガラス基板を吸着することで、ガラス基板Wとプレートを吸着力によってずれないように固定させることができる。

【0034】また、図9に示すように、コンベア本体2

0が無く、ローラー軸21がベース部材10に支持され、不図示のモーターによって回転駆動することにより基板を搬送する構成においても、同様に、搬送ローラー22とガラス基板Wとの間に擦れなく位置決めが可能である。

【0035】この場合、図10に示すように、ローラー軸21にボールベアリング等の回転方向への滑りが無く、かつ、横スライドが可能なスライド機構23を介して、搬送ローラー22を取り付けるようにすればよい。さらに、搬送ローラー22は、無負荷時にローラー軸の可動範囲の中心位置に寄せられるようにバネ24等により挟まれた構造をとっており、基板が搬送される際は、可動範囲の中央に位置する。

【0036】基板が搬送されて所定の位置にて停止した後、ガラス基板Wの位置決め機構11により幅寄せされると、搬送ローラー22がスライド機構23によってスライドする。位置決め完了時に保持機構16が上昇し、位置決めされた位置にて、搬送ローラーを保持すると共にガラス基板Wが保持される。

【0037】保持された状態で、ガラス基板の位置決め機構11は解除され、基板取り置きロボット3が、ガラス基板を把持することが可能となる。

【0038】以上述べてきたように、本実施形態によれば、ガラス基板の位置決め時に、ガラス基板を支持する支持部材がフローティング機構によって、自由に移動できるため、ガラス基板と支持部材との間に全く擦れがない。また、位置決めは、従来と同様の突き当て方式である。

【0039】従って、パーティクルの発生や、ガラス基板が帯電するようなことなく、高精度な位置決めが可能となる。

【0040】また、コンベア方式の基板搬送装置にも組み込むことが可能であり、従来の設備をそのまま活かした上で、発塵のない位置決めが可能となる。

【0041】更に、吸着によりガラス基板を保持する様々な目的の処理ステージにおいても、同様に、ステージ

上のガラス基板の位置決めにおけるパーティクルの発生を防ぐことができる。

#### 【0042】

【発明の効果】以上説明した様に、本発明によれば、ゴミ等を発生させることなくガラス基板を高精度に位置決めすることが可能となる。

#### 【図面の簡単な説明】

【図1】ガラス基板位置決め機構の一実施形態の構成を示す上面図である。

【図2】図1のA-A断面図である。

【図3】図1のB-B断面図である。

【図4】位置決めユニットの初期位置出し機構を説明する図である。

【図5】位置決めユニットの保持機構を説明する図である。

【図6】位置決めユニットのフローティング機構を説明する図である。

【図7】液晶パネルの製造工程の一例を説明する図である。

【図8】ガラス基板の位置決め方法を説明するフローチャートである。

【図9】ガラス基板の位置決め機構の他の実施形態を説明する図である。

【図10】他の実施形態のフローティング機構を説明する図である。

#### 【符号の説明】

W ガラス基板

1 位置決めユニット

10 ベース部材

11 位置決め機構

12 受け部材

13 銅球

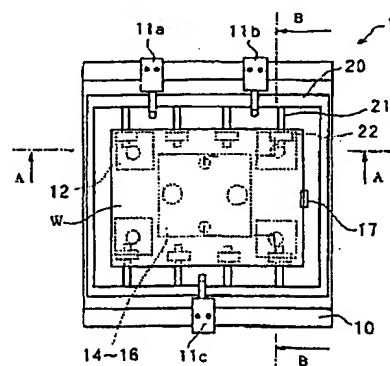
14, 15 位置決め機構

16 保持機構

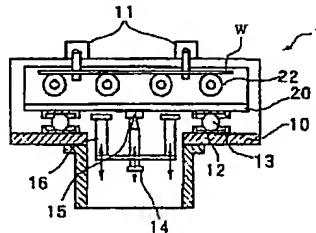
17 センサ

20 コンベア本体

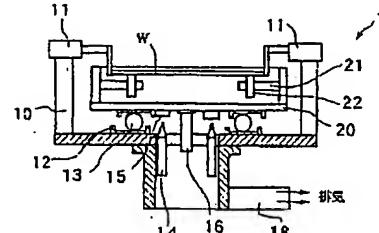
【図1】



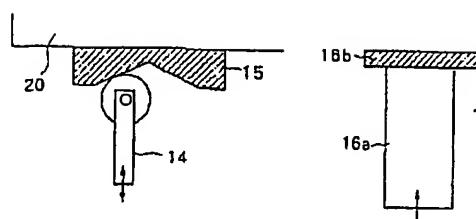
【図2】



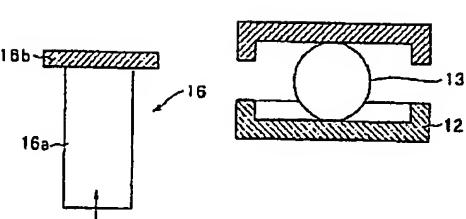
【図3】



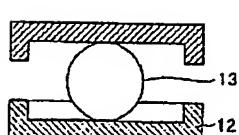
【図4】



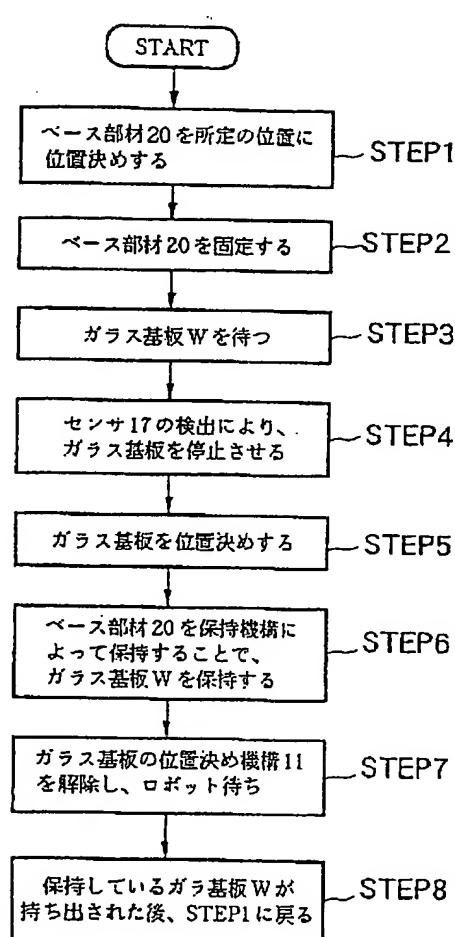
【図5】



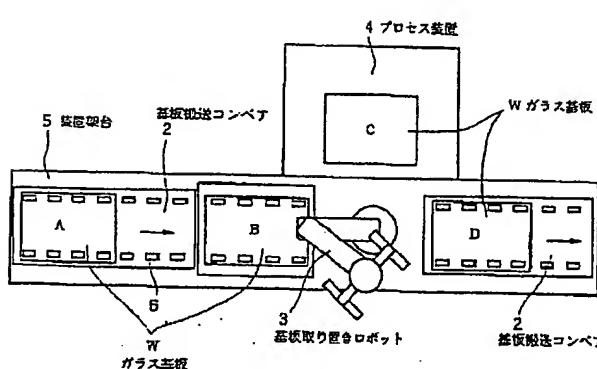
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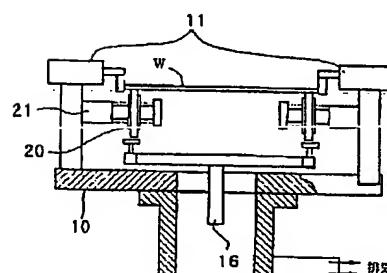
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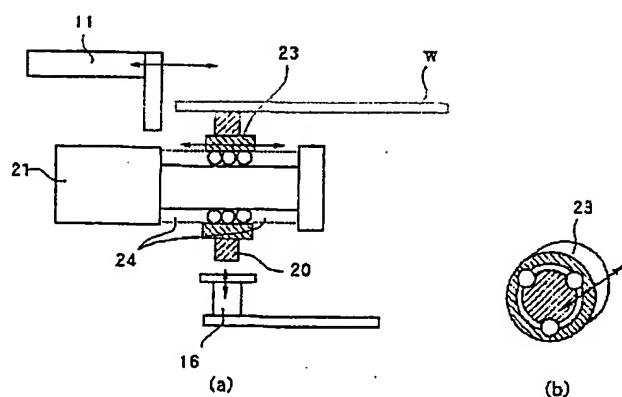
【図7】



【図9】



【図10】



フロントページの続き

Fターム(参考) 2H088 FA16 FA17 FA30 HA01 MA20  
 4G015 FB01 FB02 FC02 FC11 FC14  
 5F031 CA05 GA24 GA32 GA43 GA53  
 HA13 HA37 JA22 KA02 KA03  
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